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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/660,382

09/10/2003

Jason A. Gratz

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23713

7590

09/17/2009

GREENLEE WINNER AND SULLIVAN P C

4875 PEARL EAST CIRCLE

SUITE 200

BOULDER, CO 80301

EXAMINER

LEE, CYNTHIA K

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

09/17/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/660,382

**Applicant(s)**

GRAETZ ET AL.

**Examiner**

CYNTHIA LEE

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 August 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3, 6, 7, 26, 28, 36-38 and 47-63 is/are pending in the application.
- 4a) Of the above claim(s) 51, 52, 55-59 and 63 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 7, 26, 28, 36-38, 47-50, 53, 54 and 60-62 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/23/2009 has been entered.

***Response to Amendment***

This Office Action is responsive to the amendment filed on 6/23/2009. Claims 50-63 have been added. Claims 1-3, 6, 7, 26, 28, 36-38 and 47-63 are pending. Claims 51, 52, 55-59, and 63 are withdrawn as being drawn to a non-elected invention.

Applicant's arguments have been fully considered. Claims 1-3, 6, 7, 26, 28, 36-38 and 47-50, 53-54, 60-62 are non-finally rejected for reasons stated herein below.

Applicant's arguments with respect to the Restriction requirement were persuasive. Claims 37 and 47 were rejoined.

The 35 USC 112, 2<sup>nd</sup> rejection is withdrawn.

***Priority***

The provisional application of the instant invention 60/409516 does not support the claimed subject matter of "not greater than 200 nm or wherein the diameters of the

silicon nanoparticles or the lithium alloy thereof are not greater than 50 nm" (claim 1).

Thus, priority was not given to the instant set of claims.

### ***Information Disclosure Statement***

The Information Disclosure Statement (IDS) filed 6/23/2009 has been placed in the application file and the information referred to therein has been considered.

### ***Election/Restrictions***

Newly submitted claims 51, 52, 55-59, and 63 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

Applicant elected silicon nanofilm dated 10/11/2007. Regarding claim 55, the amorphous SiO<sub>2</sub> refers to nanoparticles, and not nanofilms. See [0078] of instant Specification. The SiO<sub>2</sub> of nanofilms is not indicated as being amorphous [0064].

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 51, 52, 55-59, and 63 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

### ***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 6, 7, 36, 38-43, 46, 48, 50, 54, 60, and 61 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Takamura (Abstract 257, the 11<sup>th</sup> International Meeting on Lithium Batteries, Monterey, CA June 23-28, 2002).

Takamura discloses an electrode comprising Si film with a thickness of 100 to 1000 Angstroms (or 10 nm to 100 nm). MPEP states that prior art which teaches a range overlapping or touching the claimed range anticipates if the prior art range discloses the claimed range with "sufficient specificity." See 2131.03.

Regarding claims 3, 38, 40, 48, 61, it is noted that they are inherent properties that are met by the structure of the electrode.

Takamura's electrode has an outer layer of SiO<sub>2</sub> (See Results and Discussion). Given the broad range of 18.5% to 70% SiO<sub>2</sub> as claimed, it is noted that Takamura's electrode possesses a similar amount. It is further supported in that the instant Specification [0064] states that an evaporated silicon film contained less oxygen" than nanoparticles that contain between 50-67% [0063]. Takamura's electrode was made by evaporation method. MPEP states that prior art which teaches a range overlapping or

touching the claimed range anticipates if the prior art range discloses the claimed range with "sufficient specificity." See 2131.03. Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983)

Regarding the limitation "synthesized by physical vapor deposition" in claim 7, it is noted that the courts have held that the method of forming the product is not germane to the issue of patentability of the product itself. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from the product of prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113. Therefore, claim 10 is anticipated by Bett, Tashiro, or Hinton. However, if the claims are not anticipated, the claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious. In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324. See MPEP 2113. Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a

different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

Regarding claims 6 and 42, the instant Specification [0065] states that the film of Example 4 is substantially amorphous. The film of Example 4 is made by the evaporation method. It is noted that Takamura's film is also made by evaporation method (see Experimental), and thus is also amorphous. Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

Regarding claim 54, it is noted that lithium reacts with silicon dioxide to form  $\text{LiO}_2$ , as stated in the instant Specification [0078]. It has been held by the courts that if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. In re Spada, 911 F.2d. 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). See MPEP 2112.01.

Regarding claim 60, the electrode of Takamura does not contain carbon black.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 26,28,44,45, 49, 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takamura (Abstract 257, the 11<sup>th</sup> International Meeting on Lithium Batteries, Monterey, CA June 23-28, 2002)

Takamura discloses an electrode comprising Si film with a thickness of 100 to 1000 Angstroms (or 10 nm to 100 nm). MPEP states that prior art which teaches a range overlapping or touching the claimed range anticipates if the prior art range discloses the claimed range with "sufficient specificity." See 2131.03.

Regarding the limitation "synthesized by physical vapor deposition" in claim 43, it is noted that the courts have held that the method of forming the product is not germane to the issue of patentability of the product itself. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from the product of prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113. Therefore, claim 10 is anticipated by Bett, Tashiro, or Hinton. However, if the claims are not anticipated, the claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious.



In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324. See MPEP 2113.

Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

Takamura discloses a cell comprising an electrode and electrolyte, but does not disclose a cell comprising an anode, a cathode, and electrolyte. Takamura discloses an improved Si film for Li ion batteries. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the anode of Takamura to a lithium ion battery for the benefit of improving the performances of portable electronic devices.

Regarding claim 49, it is noted that it is an inherent property that is met by the structure of the electrode.

Claims 37 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takamura (Abstract 257, the 11<sup>th</sup> International Meeting on Lithium Batteries, Monterey, CA June 23-28, 2002) as applied to claim 1 and 26, in view of Park (US 2002/0048705).

Takamura discloses all the elements of claim 1 and are incorporated herein. Takamura discloses that the silicon film is amorphous, but does not disclose that the film is amorphous and crystalline. Park teaches a silicon thin film for a lithium battery anode. Park teaches that the crystallinity and microstructure of the deposited thin film

can be adjusted by changing the experimental conditions [0042]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the degree of crystallinity in the film of Takamura since it is known in the art to adjust the crystallinity of silicon thin films.

### ***Response to Arguments***

Applicant's prior art arguments filed 9/15/2008 have been considered but are moot in view of the new ground(s) of rejection.

The Declaration is addressed as follows:

The Declaration states that SiO<sub>2</sub> on a silicon nanofilm at the time of the invention was an undesirable. However, the instant Specification states that SiO<sub>2</sub> layer was formed on the instant invention [0063, 0064]. Regardless of whether it was known at the time of the invention that SiO<sub>2</sub> contributes to the formation of the SEI layer or not, it is noted that Takamura's electrode forms an outer SiO<sub>2</sub> layer. Thus, the rejection is maintained.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure (attached herewith):

Li et al, The crystal structural evolution of nano-Si anode cause by lithium insertion and extraction at room temperature, Solid State Ionics 135 (2000) 181-191.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Lee whose telephone number is 571-272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cynthia Lee/  
Examiner, Art Unit 1795

/PATRICK RYAN/  
Supervisory Patent Examiner, Art  
Unit 1795